Hypothesis on the Basis of Ferromagnetism and How Ferromagnetic Elements Need Anti-Ferromagnetism to Function; New Insights into Neutrino Dynamics

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Introduction

Inspired in part by a recent study into Electron-Nucleus spin transference observed recently by Joseph Zadrozny at Colorado State University (https://www.sciencedaily.com/releases/2022/06/220606134418.htm) I have developed a cogent explanation for what drives ferromagnetism at a fundamental level in the elements iron, cobalt, and nickel. I firstly propose that a key component of ferromagnetism in these elements is opposing spins between Shell 2 and Shell 1 i.e. that Shell 1 and 2 of these elements form an innate anti-ferromagnet.

Abstract

Thanks to new research, we now know that these iron, cobalt, and nickel nuclei tend to spin and that this spin is driven by spin property transference from electrons to nuclei. As an iron, for example, nucleus spins, inbound neutrinos heading toward each nuclear proton in a ferromagnetic element will tend to strike existing electrons "just left" or "just right" of center, sort of like the way a pool cue can be used to apply "English" to a cue ball. These neutrinos will always tend to take a path that shoots like an arrow through existing electrons, straight through to one of the protons. This, I believe, is due to the fact that neutrinos are attracted both to electrons and protons despite their differing charge (this is not unheard of, in fact, it is true of neutrons.)

Provided that the element in question has sufficient temperature, the nucleus of ferromagnetic elements will spin at a sufficient velocity to generate this application of "English" to Shell 2 electrons. Because the attraction of neutrinos to protons is greater than their attraction to electrons, as the nucleus spins, the neutrinos change course in mid-flight, resulting in the "off-center hits." The neutrinos pass through freely but once again experience a course change, slingshotting and ultimately striking Shell 1 electrons, on average, with the opposite "English." With all Shell 2 electrons spinning in a direction consistently perpendicular to those in Shell 1, the shells above are shielded from the magnetic disruptions of the powerful Shell 1 electrons, of which there are only two in the case of iron, cobalt, and nickel. I believe it is the prevention of magnetic interaction between comparatively high energy Shell 1 electrons and the outer electrons that facilitates the property of ferromagnetism. In the case of ferromagnetic elements, a natural anti-ferromagnetic layer is formed as an indirect result of their nuclei's unique ability to adopt some of the spin of the electrons around them and to maintain that spin.

Other elements, despite having many properties in common with ferromagnetic elements (paramagnetic elements, for example) do not have

ferromagnetic properties, in my view, in large part because of differences in the speed of at which their nuclei spin on their own axis, which in turn is dependent upon their interaction with their electrons. These elements behave at room temperature much as iron, cobalt, and nickel do at ultra-low temperatures.

Although this hypothesis already goes a long way toward explaining many of the as-yet unexplained aspects of the physics underpinning ferromagnetism, it leaves (thus far) unexplained the exact reason why only this narrow subset of only three elements exhibits these unique properties. That they are neighbors on the periodic table is no coincidence. I will now attempt to account for exactly why it is that cobalt specifically is so well-suited to supporting this nuclear axis spin and other elements (nearly equal numbers heavier and lighter) exhibit nowhere near as much of this spin.

In order for high-energy Shell 1 electrons to exert force consistently in a direction even before the application of the "English" I already mentioned, they must do so in a way that can cause even a stationary nucleus to begin to spin and to do so in one particular direction. If forces are applied haphazardly, the spin will not appreciably accumulate; at least not enough to bestow a nucleus with the property of ferromagnetism.

Ferromagnetic elements share in common having two Shell 1 electrons. Each nucleus can be divided into two hemispheres. In the case of cobalt, there are, on average, 13 1/2 protons in each hemisphere. These two Shell 1 electrons tend to (but do not always) orbit on opposite hemispheres. This is due to the Coulomb force. Given that this is the case, there is a higher than average chance at any given time that these two electrons will be directing their magnetic energy (i.e. their North or South poles (remembering that each of these electrons are in and of themselves dipole magnets)) toward one another. This magnetism is conveyed through the width of the nucleus and may influence other electrons on the opposing side in the case of Shell 1.

After many orbits, these twin electrons develop a tendency to always have the South pole of one pointed toward the North pole of the other. Since their relative position tends to be consistently nearly diametric (in terms of orbital position) but not directly opposing, nuclear spin can gradually increase like a flywheel. The quantity of protons is critical to this.

In a lightweight element, there are not enough protons in each hemisphere for the Shell 1 electrons to be able to "gain purchase with" the surface of the nucleus, kind of like running on a slippery treadmill. There need to be at least 13 protons in a hemisphere in order for the magnetism of one of these electrons to be able to gain purchase with or exert a force against the protons leading to an equal and opposite (but consistent) force. Of these 13 protons, there tend to be about 6 at any given time (connecting their points would form a hexagon) that are in close proximity to the orbiting electron. As long as there are always six protons within a certain proximity to the orbiting electron, it is possible for force to be applied evenly to generate sufficient spin.

Why then, does adding just a few extra protons spoil the whole thing? The

answer lies in the way in which as elements get heavier, their nuclei become multi-layered just as electrons manifest in different layers. If one of these spin-transferring electrons attempts to exert a force against anything heavier than nickel, the arrangement of the sub-layers of protons with respect to the higher layers ultimately absorbs some of the force that in a ferromagnetic material would mostly translate into rotational energy. In heavier elements like copper, protons in the second layer down in the nucleus absorb magnetic energy and ultimately reduce the percentage of energy translated into useful spin to the point where the element cannot be considered ferromagnetic. Thus, there is a "goldilocks zone" for ferromagnetism in which there is both a sufficient number of surface protons present and not too many sub-surface "buried protons" which sap the magnetic energy of the electrons much as plugging too many appliances into a single outlet can result in exceeding its limitations.

Conclusion

This information should serve to fill in some of the gaps in this long-standing mystery of physics and, if confirmed, will further support my previous contentions about the role of the neutrino and the ways in which it interacts with other particles.